TECHNICAL BRIEFING – DRAFT FINAL AREA C GROUNDWATER
LONG-TERM MONITORING REPORT, ROUND H, STATISTICAL EVALUATION - MAY 2014

The document reviewed was a semiannual monitoring report for groundwater for Area C. Monitoring wells included in the program are in Area C and in the Southern Boundary Area (SBA). Area C is identified as PICA 206. Long-term monitoring is performed by ARCADIS/Malcolm Pirnie on behalf of Weston in accordance with the Record of Decision for the area signed September 1, 2009 and the Long-Term Groundwater Monitoring Plan (LTGWMP) signed November 2009. The eighth round of monitoring was conducted March 31 to April 3, 2014. The results were subjected to the fifth statistical evaluation since monitoring was initiated.

Remedies specified for Area C were as follows:

- Establish land use controls (LUCs)
- Use existing Classification Exception Area (CEA)/Wellhead Restriction Area (WRA)
- Establish and implement a long-term monitoring plan
- Develop exit strategy for groundwater monitoring
- Implement 5-year reviews.

Monitoring Program Wells

There were 16 monitoring wells in Area C and 16 monitoring wells in the SBA at the inception of the monitoring program; the SBA wells are sentinel wells in that they are the most downgradient wells at Picatinny Arsenal and would theoretically be used to detect contamination before it exited the base property. Prior to the statistical evaluation described herein there were 26 monitoring wells remaining in the program. Three Area C wells (MW-16, MW25-7, and C1-A) have been decommissioned and one well (MW 3548-3) was removed from the program because it could not be located and was presumed to have been destroyed. Two other wells are scheduled to be decommissioned before the next sampling event. Groundwater samples were collected from 19 monitoring wells including one monitoring well in Area C (DM19-1), two upgradient wells (MW25-6A and MW25-6B), and 16 SBA wells.

Analytical Parameters

Analytical parameters are as follows: vinyl chloride (three wells), arsenic (four wells), lead (three wells), and thallium (all SBA wells). The monitoring frequency is specified in the LTGWMP. The spring 2014 semiannual sampling event took place from March 31 to April 3. A total of 19 monitoring wells were sampled during the subject event. d

Numerous previous studies were conducted in the area. Area C has limited exceedances of a few volatile organic compounds (VOCs) and explosive compounds in groundwater; the occurrences are isolated and limited in extent. Lead and arsenic detections are more widespread with no specific identifiable source despite intensive investigation. Other metals including iron, manganese, aluminum, and sodium are either naturally occurring and associated with the local geology (rock formations having these constituents naturally) or not known to be related to base activities.

Evaluation of Arsenic and Lead Controls

Arsenic and lead concentrations are affected by many factors in the groundwater chemistry. Arsenic is controlled by desorption, dissolution, oxidation-reduction potential, dissolved oxygen concentration, and adsorption. Lead is affected by adsorption at the solid-water interface, precipitation, and complexation with organic matter. To examine what controls these variables were having on metal concentrations two sets of parameters were measured: for arsenic – dissolved oxygen, pH, redox, and turbidity; and for lead – pH and turbidity. Parameters were compared to analytical results for the metals. No significant difference could be identified regardless of whether the field parameters were to have a positive or negative influence on results. These results were previously reported in an earlier long-term monitoring report.

Results

Arsenic and lead were detected in one or more the groundwater samples. Thallium was not detected in any of the wells sampled. Vinyl chloride was not detected in the two upgradient wells but was detected in Well DM19-1 (16 ug/L) which was in exceedance of the level of concern (1 ug/L).

Evaluation Process for Monitoring Program Analytes and Wells

The exit strategy includes a multi-step process to determine whether analytical parameters would have the frequency of monitoring modified or the analyte would be dropped from the monitoring program.

Step A: Determine If There Are Analytes to Remove. This step does not apply to SBA wells unless all of the Area C wells have had the analyte dropped. If analytes are less than ARARs for four or more consecutive sampling events then a parameter can be discontinued. In this case one analyte passed the test for removal: thallium. Thallium had only been analyzed in SBA wells. The analyte was not detected in any of the 16 SBA wells. In addition, thallium was not detected for the past four sampling events. Based on the non-detection thallium could be omitted from future sampling events without statistical evaluation.

Step B: Determine Frequency of Sampling for Analytes Remaining in Program

Step B1: Evaluate whether analyte concentrations are increasing or decreasing. Further evaluation was required for vinyl chloride (DM19-1), arsenic (SB2-2), and lead (SB1-3). After completing the required statistical analysis it was determined that still further evaluation (Step B2) was required.

Step B2: If concentrations are not decreasing, determine if concentrations are consistent with historical data.

The data sets were subjected to statistical analysis but "most of the data sets were small and did not yield meaningful UCL statistics. Therefore, the concentration range of the historical data was compared to the mean of the most recent data."

The report states that: "The mean or maximum concentration of the analyte did not fall within the 95% confidence window of the historical data." Based on that result the data were not considered to be consistent and sampling for vinyl chloride, arsenic, and lead in the three wells will be continued on a semiannual basis.

Step C: Determine If Analytes Are Present Above Trigger Levels.

Step C is formulated to determine whether additional investigation is required. Application of this step was not required.

Conclusions

Analytical parameters were modified slightly on the basis of evaluation. Analytes that remain in one more Area C monitoring wells, the two upgradient monitoring wells, and all the SBA monitoring wells are as follows: vinyl chloride, arsenic, and lead. Thallium passed Step A of the evaluation and as a result will be discontinued from all of the SBA monitoring wells – the only wells which had been analyzed for thallium. The majority of the analytes appear to be decreasing in concentration or are at concentrations consistent with historical data.